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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,764	12/23/2004	Lee Chen	261137US6YAPCT	8509

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EXAMINER

OLSEN, ALLAN W

ART UNIT PAPER NUMBER

1763

DATE MAILED: 09/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/517,764

Applicant(s)

CHEN ET AL.

Examiner

Allan Olsen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8, 10-12, 15-21 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent Application Publication 2001/0055649 of Ogure et al. (hereinafter, Ogure).

Ogure teaches anisotropically etching Cu with a beam of oxygen atoms and then reacting the oxidized copper with H(hfac) to form a volatile copper compound. Ogure teaches introducing argon ([0161] -[0164]). Ogure teaches a particle energy range from below 30 eV to 30000 eV (see last line paragraph [0156] and figure 11). Ogure teaches the etching may occur without using any heat-up mechanism [0166].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogure.

The above noted teachings of Ogure are herein relied upon.

Ogure does not teach using a beam of neutral oxygen atom having a kinetic energy between 10 eV and 1 eV.

It would have been obvious to one skilled in the art to use a beam of neutral oxygen atom having a kinetic energy between 10 eV and 1 eV because Ogure teaches a synergistic method whereby a reaction's activation energy can be garnered from multiple sources. As such, and in view of the fact that Ogure teaches etching with a beam energy as low as 30 eV, one skilled in the art would reasonably expect that with additional energy, for example from temperature, etching would occur with a beam energy lower than 30 eV and it would be obvious for the skilled artisan to optimize conditions such as the beam energy and temperature.

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Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogure in view of US Patent 5,108,535 issued to Ono et al. (hereinafter, Ono).

The above noted teachings of Ogure are herein relied upon.

Ogure does not teach using an RF or laser induced discharge as a source of the neutral oxygen atoms beam.

Ono teaches generating a neutral oxygen atom beam from various sources including DC, RF powered discharges and laser induced discharges (see paragraph bridging columns 16 and 17).

It would have been obvious to one skilled in the art to use an RF or laser induced discharge as a source of a neutral oxygen atom beam because Ogure teaches using a DC source and Ono teaches that DC, RF and laser induced discharges are functionally equivalent with respect the generation of a neutral oxygen atom beam.

Response to Arguments

Applicant's arguments filed June 21, 2006 have been fully considered but they are not persuasive. Applicant argues that Ogure does not teach using a neutral oxygen beam. Applicant states:

"Thus, it is respectfully submitted that the description of "a beam of oxygen radicals" in Ogure describes
a beam of oxygen particles with one or more unpaired electrons, which may or may not be
neutral particles. Accordingly, "a beam of oxygen radicals" is not "a directional beam of
neutral oxygen atoms" as recited in Claim 1."

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While this statement by applicant acknowledges that Ogure's beam of oxygen radicals could be neutral it is noted that the entirety of their arguments suggest that Ogure's beam of oxygen atoms is not neutral. It seems when Ogure states, "the beam of oxygen ions or radicals", that applicant interprets the "or" of this phrase to mean "in other words". In contrast, the examiner views this phrase to mean the beam can be either charged (ions) or neutral (radicals). Explicit support for the examiner's position that the oxygen of Ogure's beam is neutral is provided in figure 32 wherein the species of the beam is indicated as being a neutral oxygen atom, O.

While figure 32 alone provides sufficient basis for the examiner to maintain the rejection over Ogure, the following patent document excerpts pertaining to oxygen radicals demonstrate that the phrase "oxygen radical" is, in large measure, taken to mean neutral oxygen.

US 20060110934 A1

[0003]...active species such as superoxide anion radicals (.O.sub.2.sup.-) or neutral oxygen radicals such as oxygen atoms...

[0036] In this embodiment, inside the plasma, not only active species such as oxygen ions or neutral oxygen radicals

US 20060027166 A1

[0102] The oxygen plasma 19 thus produced may then cause oxygen radicals (neutral excited active species) to be generated.

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US 20050266618 A1

[0029] In the plasma processing directed to circuit board 4, electrically neutral particles such as oxygen radicals

US 20060068605 A1

[0009] ...oxygen atoms and molecules are ionized, and are given kinetic energy by applying a voltage. Oxygen ions or neutral radicals are physically radiated onto an Si substrate in order to oxide a surface thereof.

US 20020009616 A1

Since ozone is very active like oxygen radicals, it is excellent in oxidization. Additionally, it is neutral like oxygen radicals, and does not damage the film. Therefore, the same effect as that of oxygen radicals is expected.

US 20020006711 A1

[0024] In plasma, neutral oxygen radicals or ozone high in activity are generated together with oxygen ions and electrons.

US 20060166428 A1

[0110] The oxygen radical is, e.g., neutral atomic oxygen or excited molecular oxygen,

5750208

Brief Summary Text - BSTX (11): By the action of the plasma, oxygen radicals, which are the neutral and reactive species,

5593741

Detailed Description Text - DETX (31):

As a result, only neutral particles such as oxygen radicals and oxygen molecules are supplied from the ion source chamber 182 onto the surface of the substrate

US 20030203572 A1

[0086] The activated oxygen means oxygen in an excited state and includes an oxygen ion and neutral radical oxygen.

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5500393

Brief Summary Text - BSTX (33):

...since oxygen plasma (including oxygen ions, neutral oxygen radicals and electrons)

4652463

Detailed Description Text - DETX (14):

By the above-described process of the present invention, oxygen atoms are produced by a photochemical process which generates only neutral, charge-free particles. The term "oxygen atom" or "atomic oxygen" is used herein to designate an oxygen atom which is a neutral free-radical

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

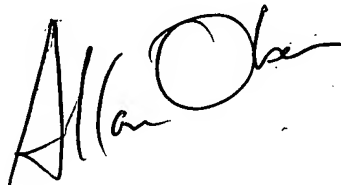
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M, W and F: 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'Allan Olsen', with a large, stylized 'O'.

Allan Olsen
Primary Examiner
Art Unit 1763